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DEC 0 9 2010

10CFR50.73

LR-N10- 0431

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington DC 20555-001

LER 311/2010-003
Salem Nuclear Generating Station Unit 2
Facility Operating License No. DPR-75
NRC Docket No. 50-311

SUBJECT: Automatic Reactor Trip Due to Reactor Coolant Pump Bus Undervoltage

This Licensee Event Report, "Automatic Reactor Trip Due to Reactor Coolant Pump Bus Undervoltage," is being submitted pursuant to the requirements of the Code of Federal Regulations 10 CFR 50.73 (a)(2)(iv)(A), "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

The attached LER contains no commitments. Should you have any questions or comments regarding this submittal, please contact Mr. Brian Thomas at 856-339-2022.

Sincerely,

Carl J. Fricker
Site Vice President - Salem

Attachments (1)

IE22

NRR

DEC 0 9 2010

cc Mr. W. Dean, Administrator, Region I, NRC
Mr. R. Ennis, Licensing Project Manager – Salem, NRC
Mr. D. Schroeder, USNRC Senior Resident Inspector, Salem (X24)
Mr. P. Mulligan, Manager IV, NJBNE
L. Marabella, Corporate Commitment Tracking Coordinator
H. Berrick, Salem Commitment Tracking Coordinator

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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4. TITLE
Automatic Reactor Trip Due to Reactor Coolant Pump Bus Undervoltage

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	17	2010	2010	0 0 3	0	12	09	2010		DOCKET NUMBER

9. OPERATING MODE
1

10. POWER LEVEL
100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Brian Thomas, Senior Compliance Engineer	(856) 339 -2022

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	EL	90	G080	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On October 17, 2010, at approximately 0512 hours, Salem Unit 2 automatically tripped due to bus undervoltage for the 21 through 24 Reactor Coolant Pumps (RCPs). The non-safety related group buses which power the RCPs were being fed from the Unit 2 Auxiliary Power Transformer (APT). The APT is directly powered from the Unit 2 main generator. At the time of the trip the main generator voltage regulator was in manual control and was being transferred to automatic control. During the voltage regulator transfer to automatic, a loss of excitation occurred. This loss of excitation led to the undervoltage condition on the group buses. The 22 through 24 RCPs tripped following the reactor trip when their respective breakers opened on undervoltage, the 21 RCP continued to run through the event. The 21 and 22 Auxiliary Feedwater (AFW) pumps started as a result of the trip of both main feedwater pumps. The 23 AFW pump started as a result of low steam generator levels in all four steam generators. Unit 2 was stabilized in Mode 3 with a reactor coolant temperature of 547°F and a reactor coolant pressure of 2235 psig.

The cause of the automatic reactor trip was an undervoltage condition on the non-safety related group buses which power the RCPs. The undervoltage condition was the result of a loss of main generator excitation during the transfer of the voltage regulator from manual to automatic. Troubleshooting determined that loss of excitation was the result of a degraded 43A transfer relay that failed to transfer excitation control from the manual voltage regulator to the automatic voltage regulator. Corrective actions included replacement of the 43A transfer relay.

This report is being made in accordance with 10CFR50.73(a)(2)(iv)(A), "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)...".

LICENSEE EVENT REPORT (LER)

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Salem Generating Station Unit 2	05000311	2010	- 0 0 3 -	00	2 of 3

NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

Westinghouse – Pressurized Water Reactor (PWR/4)

Main Generator Voltage Regulator {EL/90}
Reactor Coolant Pump {AB/P}

* Energy Industry Identification System {EIIS} codes and component function identifier codes appear as {SS/CCC}

IDENTIFICATION OF OCCURRENCE

Event Date: October 17, 2010

Discovery Date: October 17, 2010

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 2 was in Operational Mode 1. No structures, systems or components were inoperable at the time of the discovery that contributed to the event.

DESCRIPTION OF OCCURRENCE

On October 17, 2010, at approximately 0512 hours, Salem Unit 2 automatically tripped due to bus undervoltage for the 21 through 24 Reactor Coolant Pumps (RCPs) {AB/P}. The non-safety related group buses which power the RCPs were being fed from the Unit 2 Auxiliary Power Transformer (APT). The APT is directly powered from the Unit 2 main generator. At the time of the trip the main generator voltage regulator {EL/90} was in manual control and was being transferred to automatic control. During the voltage regulator transfer to automatic, a loss of excitation occurred. This loss of excitation led to the undervoltage condition on the group buses. The 22 through 24 RCPs tripped following the reactor trip when their respective breakers opened on undervoltage, the 21 RCP continued to run through the event. The 21 and 22 Auxiliary Feedwater (AFW) pumps started as a result of the trip of both main feedwater pumps. The 23 AFW pump started as a result of low steam generator levels in all four steam generators. Unit 2 was stabilized in Mode 3 with a reactor coolant temperature of 547°F and a reactor coolant pressure of 2235 psig.

Unit 2 returned to service (generator output breaker closed) on October 20, 2010.

This report is being made in accordance with 10CFR50.73(a)(2)(iv)(A),"any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)...."

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Salem Generating Station Unit 2	05000311	2010	0 0 3	00	3 of 3

NARRATIVE

CAUSE OF OCCURRENCE

The cause of the automatic reactor trip was an undervoltage condition on the non-safety related group buses which power the RCPs. The undervoltage condition was the result of a loss of main generator excitation during the transfer of the voltage regulator from manual to automatic. Troubleshooting determined that loss of excitation was the result of a degraded 43A transfer relay that failed to transfer excitation control from the manual voltage regulator to the automatic voltage regulator.

PREVIOUS OCCURRENCES

A review of LERs at Salem Station dating back to 2007 did not identify any similar events.

SAFETY CONSEQUENCES AND IMPLICATIONS

There was no safety consequence associated with this event. All safety systems operated as required in response to the RCP bus undervoltage and subsequent reactor trip.

The RCP bus undervoltage trip provides reactor core protection against departure from nucleate boiling (DNB) as a result of loss of voltage to more than one RCP. The undervoltage set points assure a reactor trip signal is generated before the reactor coolant low flow trip setpoint is reached. The potential safety consequences associated with this event are bounded by the Salem UFSAR Chapter 15 Condition II event for the partial loss of forced reactor coolant flow. The Chapter 15 analysis only credits the reactor trip on loss of flow which occurs later in time sequence than the RCP undervoltage trip. Tripping the reactor on RCP undervoltage increased the margin to DNB as analyzed in the UFSAR.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guidelines, did not occur. This event did not result in a condition that could have prevented the fulfillment of a safety function of a system needed to shutdown the reactor and maintain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

CORRECTIVE ACTIONS

1. The 43A transfer relay was replaced prior to placing the main generator back into service.
2. A technical evaluation was performed to review why the 22 through 24 RCP breakers opened and the 21 RCP did not. The degradation in bus voltage was close to the drop out values of the undervoltage relays for each bus. The 21RCP not opening was a slight difference in the dropout value of the undervoltage relay but within the tolerance range for this relay. Proper relay calibration was verified following the reactor trip.

COMMITMENTS

No commitments are made in this LER.